







**DATA STRUCTURES WITH C**  
**SEMESTER - 2**



Time : 3 Hours ]

[ Full Marks : 70

**GROUP - A**

**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for the following : 10 × 1 = 10

i) Worst case time complexity of the heap sort algorithm is

- a)  $O(N \log_2 N)$
- b)  $O(N \ln N)$
- c)  $O(n^2)$
- d)  $O(n^3)$ .

ii) Pick out the invalid statement from the following :

Queue can be used

- a) in the printer
- b) to access to disk storage
- c) for function call
- d) none of these.

iii) In linked list, the logical order of elements

- a) is same as their physical arrangement
- b) is not necessarily equivalent to their physical arrangement
- c) is determined by their physical arrangement
- d) none of these.



iv) The method of collision processing requires prime area and overflow area of

- a) linked collision processing
- b) linear collision processing
- c) quadratic collision processing
- d) none of these.




v) Which is not representation of a graph ?

- a) Adjacency matrix
- b) Edge list
- c) Adjacency list
- d) All represents a graph.

vi) Which of the following is not a required feature of a good hashing algorithm ?

It should

- a) be repeatable
- b) allow even distribution of records throughout the allocated space
- c) minimize synonyms
- d) none of these.

vii)  $A$  is an array of size  $m * n$ , stored in the row major order. If the address of the first element in the array is  $M$ , the address of the element  $A(i, j)$  ( $A(0, 0)$ ) is the first element of the array and each element occupies one location in memory that is

- a)  $M + (i - j) * m + j - 1$
- b)  $M + i * m + j$
- c)  $M + (j - 1) * m + i - 1$
- d)  $M + (i - 1) * n + j - 1.$



viii) Reference count may be maintained for memory locations used in linked list for the purpose of

- a) Copying
- b) Compaction
- c) Reclamation
- d) Traversal.



ix) The maximum number of nodes in a binary tree of depth 5 is

- a) 31
- b) 16
- c) 32
- d) 15.

x) In which collision processing method, it is not required to detect a given list position, if it is occupied or not ?

- a) Quadratic
- b) Linked
- c) Rehashing
- d) None of these.

**GROUP – B**

**( Short Answer Type Questions )**

Answer any *three* of the following.

3 × 5 = 15

- 2. Is circular queue a non-linear data structure ? Justify your answer. 5
- 3. Name some non-linear data structures. Critically compare linear and non-linear data structures. 1 + 4
- 4. Write a C function to reverse a linked list physically. ( That is change the node positions. )
- 5. Write the push( ) and pop( ) functions for a stack after describing the Data-Structure clearly. 5
- 6. What is hashing ? Why is it used ? Explain the chaining method of collision resolution in hashing. 5



## GROUP - C

( Long Answer Type Questions )

Answer any *three* of the following.

3 × 15 = 45

7. a) Define B-tree. Construct one B-tree of order 3 with the following data :  
50, 40, 60, 30, 70, 20, 80, 10, 90, 9, 99. 8
- b) Construct a binary Tree from the following information :  
In order : 50, 10, 30, 90, 60, 80, 40, 20, 70  
Preorder : 60, 10, 50, 90, 30, 40, 80, 70, 20. 7
8. a) Explain AVL tree. Discuss how to insert an element in an AVL tree ( Explain all cases ). 8
- b) Write an algorithm for deletion of an element from BST. ( Include all the cases ). 7
9. Explain Heap. What is priority queue ? How will you implement a priority queue using Heap ? Explain with suitable example. 4 + 3 + 8
10. a) In how many ways, can you represent a graph in a computer memory ? Which one is advantageous and why ? 4
- b) Write down the DFS algorithm. 6
- c) How is random access file different from indexed sequential file ? What is Garbage collection ? 5
11. a) Explain Polish and Reverse polish notations. 5
- b) Convert the following : 5 + 5
- i)  $A + (((B - C) * (D - E) + F) / G) * (H - I)$  [ POSTFIX ]
- ii)  $ABC - / DEF + * +$  [ PREFIX ].

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